Gambling Disorder: Similarities and Differences with Substance Use Disorders

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Disclosure Information

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I will discuss the following off-label use and/or investigational use in my presentation.
THE WEIRD WORLD OF GAMBLING

WHY DO WE BET SO MUCH?
WHO REALLY WINS?
WHO REALLY LOSES?

Source: Look Magazine, March, 1963
Gambling Disorder

Persistent and recurrent maladaptive gambling behavior:

Preoccupation
Tolerance
Inability to control
Withdrawal
Escape

Lying
Illegal acts
Impairment
Relying on others
Chasing losses
Categorization

- DSM-IV vs DSM-5
- ICD-10 vs ICD-11
Impulsive-compulsive behaviors

- Drug Addiction
- ADHD
- Gambling
- Stealing
- Sexual behavior
- Trichotillomania/Skin Picking
- OCD
Addiction - Arbitrary Definitions?

- Stigmatize addicts and endorse a runner’s high?
- Equivocate about caffeine and alcohol and condemn cocaine?
- 18th century – books were addictive: women would have passions awakened
- Animals and humans self medicate
“At this point, we know it’s addictive.”
Behavorial Addictions?

- Gambling
- Stealing
- Sexual behavior
- Shopping
- Fire-setting
- Internet use
- Overeating
Clinical Aspects of Addiction
Common Core Qualities of Addictions

- Repetitive or compulsive engagement in a behavior despite adverse consequences
- Diminished control over the problematic behavior
- Appetitive urge or craving state prior to engagement in the problematic behavior
- Hedonic quality during the performance of the problematic behavior.
Common Core Qualities of Addictions

- Tolerance
- Withdrawal
- Impairment in major areas of life functioning
- Telescoping
Substance Addictions and Gambling

- Both have onset in adolescence and young adulthood
- Higher rates in these age groups than in older adults.
- Both have natural histories that may exhibit chronic, relapsing patterns, but with many people recovering on their own without formal treatment (so-called “spontaneous” quitting)
Ego-syntonic nature is similar to substance use behaviors.

Gambling and substance addictions may become less ego-syntonic and more ego-dystonic over time - the behavior becomes less pleasurable and more of a habit or compulsion.

Becomes motivated less by positive reinforcement and more by negative reinforcement (e.g., relief of dysphoria or withdrawal).
Comorbidity of Gambling & Substance Addictions

- Relative risk for an alcohol use disorder increased 3.8-fold when disordered gambling was present.

- 20% of alcohol dependent individuals have a gambling problem
<table>
<thead>
<tr>
<th>Group</th>
<th>Percentage</th>
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<tbody>
<tr>
<td></td>
<td>Range</td>
</tr>
<tr>
<td>Adult</td>
<td>&lt;1 - 2%</td>
</tr>
<tr>
<td>Adolescent</td>
<td>1 - 9%</td>
</tr>
<tr>
<td>Adolescent-Drug Tx</td>
<td>9 - 13%</td>
</tr>
</tbody>
</table>
Cannabis and Gambling

- Many young adult gamblers smoke marijuana
- Unclear the effects of marijuana smoking on gambling
- Gamblers using cannabis had higher rates of current alcohol use disorders and more frequent gambling behavior per week.
- Gamblers who used cannabis also exhibited significantly greater scores on measure of attentional impulsivity.
207 non-treatment seeking young adults ('normal weight' BMI<25, 'overweight' BMI≥25; or 'obese' BMI≥30)

22 (10.6%) were obese and 49 (23.7%) were overweight.

Obese gamblers consumed more nicotine and lost more money per week to gambling.

Obesity - associated with decision making and sustained attention impairments in gamblers
Developmental Aspects of Addiction
Developmental Biology

- Behavioral addictions generally start in young adulthood.

- Environmental and genetic influences - vulnerability to and expression of behavioral addictions

- Changes in brain structure and function during adolescence might influence the motivation to engage in risk-taking behaviors.
Brain Development

- During late childhood, neurons increase their number of connections.
- But around 11 – GIRLS; 12½ - BOYS:
  - Some of these connections are pruned off.
Development

- When the pruning is complete, the brain is faster and more efficient.

- But... during the pruning process, the brain is not functioning at full capacity.
Notice: Judgment is last to develop!
Age 24

- Judgment
- Emotion
- Motivation
- Physical coordination, sensory processing

Balance
In the presence of stress...
Role of Trauma

- Neglectful parenting style
- Addictions more likely associated with
  - physical neglect
  - emotional abuse
  - Sexual abuse
Youth Problem Behaviors

- delinquency
- sexual behavior
- smoking
- drug use
- male
- gambling
Suicidality

Rates of suicidality have been reported in 20% to 40% of individuals with gambling disorder.

Individuals with gambling disorder may be 3-4 times as likely as the general population to attempt suicide.

What about lower levels of gambling problems?
Subsyndromal Gamblers and Suicidality

- 1-3 gambling disorder criteria (DSM-5)

- 18.4% endorsed scores on the MINI suicidality module (cf. to 5.3% in population)

- Degree of gambling behavior or the financial consequences of gambling did not differ between groups.

- Largely attributable to anxiety due to gambling.
Male twin study - 12 to 20% of the genetic variation in risk for gambling, and 3 – 8% of the nonshared environmental variation in the risk for gambling, accounted for by risk for alcoholism.

Additionally, 64% of the co-occurrence between gambling and alcoholism - attributable to genes that simultaneously influence both disorders. 
Neurobiology
Motivational Neural Circuits

Multiple brain structures underlying motivated behaviors.

Motivated behavior involves integrating information regarding internal state (e.g., hunger, sexual desire, pain), environmental factors (e.g., resource or reproductive opportunities, the presence of danger), and personal experiences (e.g., recollections of events deemed similar in nature).
Addictive substances exert to varying degrees their effects on the brain’s reward pathways, particularly the ventral striatum, and thereby implicate the dopaminergic and opioid systems.

Pro-dopaminergic medication has been linked with gambling.
Aberrant white matter tracts of the corpus callosum across impulsive and compulsive disorders

White matter of corpus callosum enables communication and integration of information - implicated in cognitive functioning, including top-down inhibitory control.

Vulnerability marker (or trait marker)?
Gambling disorder was associated with significant reductions (average 15.8–19.9 %) in cortical thickness, versus controls.

Predominantly in right frontal cortical regions.

Pronounced right frontal morphometric brain abnormalities occur in gambling, supporting neurobiological overlap with substance disorders.
Dopamine and Parkinson’s

Gambling and substance addictions reported in Parkinson’s Disease

Association with Dopamine Agonist Treatment

Prior addiction and Family history of addiction
Associated with addictions in Parkinson’s
RESULTS

- N=22 (91.7%) completed the study
- Side effects were mild/moderate; no liver toxicity found

![Bar chart showing PG-YBOCS, Urges, and Behavior with p-values: p=.001, p=.009, p=.003]
Expressed behavior

Cognition

Brain abnormalities

Etiology

Genetic ↔ Environmental
Executive function deficits are greater in those with addictions than in control subjects, including:

- Planning
- Cognitive flexibility
- Inhibition
Cognitive Problems at Lower Gambling Levels

Cognitive deficits in gambling disordered people across a variety of domains.

Majority of studies have reported impaired response inhibition performance (i.e. increased motor impulsivity) in gambling disorder.

Understanding the chain of progression from recreational gambling to gambling disorder is vital towards understanding the pathogenesis.
Stop Signal Reaction Time

<table>
<thead>
<tr>
<th>Groups</th>
<th>SSRT Average Score</th>
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<tbody>
<tr>
<td>Recreational</td>
<td>174.6</td>
</tr>
<tr>
<td>Sub-Syndromal Gambling Disorder</td>
<td>182.7</td>
</tr>
<tr>
<td>Gambling Disorder</td>
<td>192</td>
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</tbody>
</table>
Race/Ethnicity

- Young black adults with gambling disorder reported more symptoms of gambling disorder and greater scores on a measure of compulsivity.

- Young black adults exhibited significantly higher total errors on a set-shifting task, less risk adjustment on a gambling task, greater delay aversion on a gambling task, and more total errors on a working memory task.

- Findings suggest that clinical and neurocognitive aspects of gambling disorder different between racial-ethnic groups.
Inhibitory Control - Familial

A

SSRT (ms)

Unrelated healthy volunteers  Siblings  Stimulant-dependent individuals

B

X = 39 mm

C

FA in right inferior frontal gyrus

0.575
0.55
0.525
0.5
0.475
0.45
0.425

150 200 250 300 350 400
Complex Findings

- Gambling disorder shows components of both impulsivity and compulsivity.

- Best to consider impulsive and compulsive features as existing along a spectrum with one at each end?
Similar Behavior, Disparate Cognitive Profile
- Conflicting results suggest possible variation in neurocognition.
- Possible transdiagnostic conceptualization of behavioral addictions.

A Dynamic Combination
- More useful to assess compulsivity/impulsivity as independent features or along a continuum?
Neurochemistry of Behavioral Dyscontrol

GLUTAMATE
SEROTONIN
DOPAMINE

Impulsivity

GLUTAMATE
DOPAMINE
Treatment Implications
I love my problems.
“Betcha I recover before you do.”
GA High Dropout Rates

- 22.4% attended only 1 meeting,
- 15.5% attended only 2 meetings,
- 7.5% earned a 1-year abstinence pin.
- Those who stayed more likely to have initial realistic expectations of GA and a spouse in GamAnon.
- Those who dropped out more likely to endorse “controlled gambling,” and did not identify with severity of problems as other members.
Self-Exclusion Programs
Psychosocial Treatments

- Multiple controlled studies
- Cognitive Behavioral Therapy
- Sessions 1 to 16
- Increased awareness of irrational cognitions, and cognitive restructuring.
- Identification of gambling triggers and the development of non-gambling sources to compete with the reinforcers associated with gambling.
Cognitive Behavioral Therapy

► Psychoeducation

► Increased awareness of irrational cognitions, and cognitive restructuring.

► Identification of gambling triggers and the development of non-gambling sources to compete with the reinforcers associated with gambling.
A. Antecedent (Triggers)
   - Particular people
   - Environment
   - Feelings
     e.g., urges, argument with spouse, boredom, anxiety

B. Behavior
   - Gambling/alternate behavior
     e.g., I drove by the bar, next think I knew it was last call
   - Abstinence
     e.g., I thought about the effect it would have on my family, and took a different route home

C. Consequence
   - Positive
     e.g., I gambled and I forgot about that argument with my wife
   - Negative
     e.g., the next day, I felt like I’m a failure.
Groups

- Cognitive restructuring
- Coping skills/identification of high-risk situations.
- Imaginary exposure with response prevention.
- Financial limit setting and activity scheduling of leisure activities.
- Problem-solving training
- Relapse prevention
Brief Interventions

- Single-session interventions, workbooks, bibliotherapy, or motivational interviewing.

- Workbooks include CBT and motivational enhancement techniques.

- CBT workbook, a workbook plus a telephone motivational enhancement intervention, or a wait-list.
Imaginal Exposure

Client and Therapist develop an imaginal exposure script that includes all the relevant internal and external triggers that relate to the behavioral addiction.

Urges or cravings can be activated using exposure to triggering events via imaginal exposure exercises.
Imaginal Exposure

“It’s Friday and I have been looking forward to gambling all week. As I am thinking about gambling right now, my urge = 75. Work has been quite stressful and it will feel good to escape for a while and have some fun at the casino. I am bringing $200 and I have to leave the casino when that is gone, maybe 2-3 hours. I hope the money can last a little while so I don’t have to leave so soon. I notice my heart flutter slightly, have butterflies in my stomach, and I can hardly wait to get there. I am hoping my favorite machine is available and the traffic on the way to the casino is not too bad.
Motivational Interviewing Plus Imaginal Desensitization

Cognitive Behavioral Therapy
Gamblers Anonymous

Percentage Improved
6 months

Chart showing the percentage of improved cognitive behaviors at 6 months for Gamblers and Anonymous groups.
Relapse Prevention

► Variant of cognitive-behavioral therapy; main approach is:
  ▪ Identification of “triggers” to resume use
  ▪ Planning and rehearsal of avoidance
  ▪ Planning and rehearsal of escape

► “Slip” not equal to relapse
### Motivation to Quit Behavioral Addictions

<table>
<thead>
<tr>
<th>1) <strong>Positive</strong> aspects of impulsive behavior (what are the positive things behavioral addiction gives me?)</th>
<th>2) <strong>Negative</strong> aspects of quitting (what do I lose if I stop behavioral addiction?)</th>
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| 3) What are the **negative** consequences of behavioral addiction (current and future?) | 4) What are the **advantages** of quitting behavioral addiction (what do I have to gain?) |
I CAN'T STOP DREAMING ABOUT WORK.

AND I USUALLY SLEEP AT WORK, SO I'M DREAMING ABOUT SLEEPING AND IT'S FREAKING ME OUT.

HAVE YOU CONSIDERED DOING WORK?

I WANT PILLS, YOU QUACK.
The endogenous opioid system influences the experiencing of pleasure.

Opioids modulate mesolimbic DA pathways via disinhibition of γ-aminobutyric acid input in the ventral tegmental area.

Gambling or related behaviors have been associated with elevated blood levels of the endogenous opioid β-endorphin.
Opioid Antagonists

- The mu-opioid system:
  - underlies urge regulation through the processing of reward, pleasure and pain, at least in part via modulation of dopamine neurons in mesolimbic pathway through GABA interneurons.
Rates of Never Relapsing According to Treatment Group (n=97)

Naltrexone for Gambling Disorder

METHODS
• n=77 with GD
• Double-blind, placebo-controlled
• 11-weeks
• Dose titration: 25mg/d – 250mg/d

RESULTS
• Significant benefit in CGI-Improvement (both patient and clinician-rated) and Gambling Symptom Rating Scale
Cognitive Enhancers with CBT
**$N$\text{-acetylcysteine (NAC)}**

- Amino-acid and antioxidant
- Potentially modulates brain glutamate transmission
- Levels of glutamate within the nucleus accumbens mediate reward-seeking behavior
- Lacks significant side effects

**Open-Label study of NAC in Gambling Disorder**

- n=27 subjects, mean age 50.8 years, 44.4% female
- Dose titration from 600mg/d to 1800mg/d
- Required to have moderate cravings to gamble
Open-Label Study of NAC in GD

RESULTS

• YBOCS: Scores decreased 41.9% from baseline to endpoint
Open-Label Study of NAC in GD

Responders (≥30% decrease in PG-YBOCS and “Much” or “Very much” improved on CGI-I scale) randomized to NAC or placebo for 6-weeks

RESULTS

• N=16 (59.3%) met responder criteria

• Mean effective dose: 1476.9 (±311.3) mg/d

Figure. Percentage of subjects meeting responder criteria each week of the double-blind discontinuation phase.
Need for Integrated Treatment
Public Health Significance

Gambling associated with High Rates of:

- Divorce
- Poor General Health
- Mental Health Problems
- Job Loss and Lost Wages
- Bankruptcy, Arrest and Incarceration
Co-Occurring Disorders

The graph illustrates the prevalence of various co-occurring disorders. It shows a comparison between SUDs, Affective, Anxiety, and ICDs across different categories. The data indicates a significant overlap, with SUDs and Affective disorders being the most co-occurring, followed by Anxiety and ICDs.
Special Concerns

- Suicide Ideation
- Suicide Attempt
- Threat of Violence to Others
- Significant Loss/Grief
- Traumatic Event
Social/Personal Consequences

- Family dysfunction and domestic violence
- Alcohol and other drug problems
- Significant financial problems
  - bankruptcy, unemployment, poverty)
- Criminal behavior
  - theft, prostitution, homicide, fraud, embezzlement)
Legal/Criminal Issues
Other Health Issues

Health concerns of gamblers:

- Heart disease
- Liver disease
- Hypertension
- Obesity
Problems with Youth Gambling

- Poor grades OR=3.9
- Tobacco use OR=2
- Marijuana use OR=2
- Moderate and heavy alcohol use OR=2.3
- Drug use OR=3.2
- Depression OR=1.8
- Serious fights OR=2.5
- Carrying a weapon OR=2.1
Evidence-Based Integrated Treatments

• Family
• Legal
• Health
• Psychological
• Pharmacological
• Financial
• Developmental
QUESTIONS?

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